

FOSSARIA OBRUSSA RODECKI var. nov. Pl. 7, figs. 7.

Shell small, elongated, narrow; spire and aperture about equal in length; whorls $5-5\frac{1}{2}$, loosely coiled, rounded, with distinct sutures; spire sharply pointed, somewhat scalariform in many specimens; body whorl flattened, elongated; aperture long ovate, narrow, wider at lower part; outer lip thin without varix; inner lip narrow, triangular, reflected over umbilical region leaving a small umbilical chink; columella with slight twist resembling a plait; a thin wash of callus on parietal wall; surface shining, sculpture of fine growth lines without spiral lines; color yellowish horn.

<i>Length</i>	<i>Diameter</i>	<i>Aperture Height</i>	<i>Aperture Diameter</i>	
10.0 mm.	4.1 mm.	5.0 mm.	2.0 mm.	Holotype.
9.0 mm.	3.6 mm.	4.1 mm.	1.6 mm.	Paratype.

Type locality: Swan Lake, Montana, collected by Junius Henderson and Hugo G. Rodeck. Types: Museum of Natural History, University of Illinois, No. Z38975; Baker collection, No. 3545; Academy of Natural Sciences of Philadelphia, No. 166255.

This interesting little *Fossaria* is another form discovered by that indefatigable worker, Professor Junius Henderson. It appears to be a marked variety of *obrussa* characterized by its narrow shell, long, narrow and pointed spire and narrow aperture. Typical *obrussa* occurs in Montana, Idaho, and Utah, but differs uniformly in its wider shell, aperture, and spire. Hannibal's *cooperi* from California has a rounded aperture, more flattened whorls and a wider inner lip which is not triangular but flatly, evenly rounded, emarginating the umbilical opening. *Fossaria exigua* has a much rounder aperture, more rounded whorls and a less acute spire. The name is in honor of Mr. Hugo G. Rodeck, Curator of the University of Colorado Museum.

SOME SHELLS FROM THE NORTH CAROLINA "BANKS"

BY HORACE G. RICHARDS
New Jersey State Museum, Trenton, N. J.

Several times during the last few years the writer has had occasion to collect shells from certain of the beaches along the

North Carolina coast as well as at Virginia Beach, Va., Myrtle Beach, S. C., and elsewhere in the southern states. On all occasions he was impressed with the large percentage of shells that appeared to be fossil. Many were very worn; others were black in color and resembled those often found on the New Jersey beaches and which were considered as having been washed from some nearby Pleistocene deposit.¹

In July, 1935, he had the opportunity of making a more complete collection of these shells on a trip along the North Carolina "Banks" from Cape Hatteras Light to Bogue Beach, a distance of about 100 miles. In October, 1935, a briefer trip was taken between Nags Head and Oregon Inlet. On both trips he was accompanied by Allen L. Midyette, Jr., of Swan Quarter, N. C., who assisted in the collecting. The collecting was part of a more extensive study of the Pleistocene of the Atlantic Coastal Plain and was made possible by a grant from the Carnegie Institution of Washington.²

To the United States Coast Guard also belongs much of the credit for the July trip. Through the kindness of Acting Commandant L. C. Covell, the officers in charge of the various stations along the coast provided us with transportation facilities as well as numerous other courtesies. Without this valued cooperation this paper could never have been written. Dr. Herbert Prytherch, Director of the Bureau of Fisheries Laboratory at Beaufort, N. C., also provided us with collecting facilities.

The barrier beaches along the North Carolina coast are locally known as "banks" and are separated from the mainland by Pamlico Sound and similar bodies of water. Some parts of the "banks," for instance, Hatteras and Ocracoke, are as much as 30 miles from the mainland; other parts, such as Bogue Bank, are much closer. West of Pamlico Sound the land is very flat and appears to form a low terrace plane (Pamlico) limited westward by a slight escarpment where the land rises to the next terrace plane (Talbot). The Pamlico terrace is everywhere under 25 feet in elevation and is composed of sand and clay in many

¹ Colton, H. S., *Nautilus* 28, 52-54 (1914); Richards, H. G., *Proc. Amer. Philos. Soc.* 72, 181-214 (1933).

² Complete report in press, *Bull. Geol. Soc. Amer.*

places overlain by a muck deposit. The sands and clays (Pamlico formation) are highly fossiliferous and are thought to have been deposited during the last interglacial stage. The fauna consists of numerous species now extinct in North Carolina waters but living in warmer seas farther south. It seemed logical to suppose that this marine formation (Pamlico) would extend seaward, probably dipping beneath the recent deposits of the sea floor, and that this might have been the source of some of the fossils on the North Carolina Banks.

At the exact tip of Cape Hatteras we collected some unusually large specimens of *Fulgur perversum* L., 11 inches long, and *Venus campechiensis* Gmel., 5 by 6 in. While these two species do live in North Carolina water to-day, they rarely if ever attain such proportions. Furthermore the specimens resembled those found on the spoil banks of the Intra-Coastal in Hyde County, N. C., where the best Pamlico fossils have been obtained. Still stronger evidence that at least some of the shells on the "Banks" were derived from the Pleistocene was the finding of large pieces of coquina at several places along the beach between Hatteras and Ocracoke. The coquina was very similar to that of the Anastasia formation of the coast of Florida which has been correlated with the Pamlico. Similar coquina occurs at several places in the Pamlico, notably near Myrtle Beach, S. C., and Old Fort Fisher, N. C., and is not reported north of Carolina Beach, N. C. The presence of the coquina near Cape Hatteras may indicate that this deposit extends north of Carolina Beach below present sea level and that fragments from the deposit are occasionally washed onto the beaches. The following species were identified from the coquina collected from the banks: *Venus mercenaria* Linné, *Donax variabilis* Say, *Mulinia lateralis* Say, *Ostrea virginica* Gmelin, *Pecten gibbus* Linné, *Dosinia discus* Reeve and *Rangia cuneata* (Gray)(?). All these are known from the coquina at Old Fort Fisher. *Rangia* is a Gulf of Mexico species; the others live in the region to-day.

The Pliocene (Waccamaw formation) is probably not very deeply buried near the shore line and it may form the sea bottom some miles offshore, thereby accounting for the presence of certain Pliocene species on the "banks."

The fossil shells were more numerous south of Cape Hatteras than north of that cape. Among the loose shells which were probably fossils collected from the above-mentioned beaches the following are especially interesting:

Arca secticostata Reeve. Bogue Beach; Pliocene or Pleistocene, probably the latter; not known to-day north of Cape Fear.

Arca auriculata Lamarck(?). One shell closely resembling this species was found at Kill Devil Hills, N. C., in May, 1932; probably Pleistocene: the species at present is known only from the Florida Keys and the West Indies.

Arca occidentalis Philippi. Probably Pleistocene; present range North Carolina to West Indies, but rare north of Florida.

Arca limula Conrad. Resembles those found in the Waccamaw (Pliocene).

Arca ponderosa Say. Typical form (Pleistocene and Recent); two shells, possibly intermediate between *A. ponderosa* Say and *A. limula* Conrad found at Nags Head and near Oregon Inlet.

Pecten eboreus Conrad var. Pliocene; similar to specimens from the Caloosahatchie of Florida and the Waccamaw of the Carolinas.

Glycymeris americana DeFrance. Pliocene or Pleistocene.

Rangia cuneata (Gray). Common in the Pleistocene of North Carolina; at present confined to the Gulf of Mexico.

Lucinia chrysostoma Philippi. Probably Pleistocene; present distribution, Florida and West Indies.

The following are probably Pleistocene: *Arca campechiensis* Gmelin, *A. transversa* Say, *A. incongrua* Say, *Callocardia morrhuana* Linsley, *Cardium muricatum* Linné, *Pecten gibbus* Linné, *Fulgur perversum* Linné, *Venus campechiensis* Gmelin, *Pholas campechiensis* Gmelin, *Cassis madagascarensis* Lamarck, *C. inflata* Shaw, *Panope bitruncata* Conrad, *Strombus pugilis alatus* Gmelin, *Polynices heros* Say. In addition other species, too numerous to be listed here, were probably Pleistocene fossils.

The mixed character of the fauna of these beaches is very confusing to the collector. It is difficult, if not impossible, to tell whether a shell is recent or fossil. A great many southern species have their recorded northern limit in North Carolina. While it is undoubtedly true that many warm water species do occur near Cape Hatteras, it is probable that some of these records are based upon Pleistocene fossils found on the beaches. As we have

seen the late Pleistocene seas appear to have been warmer than the present and such species as *Arca auriculata* Lamarck, *A. sec-ticostata* Reeve, *Lucina chrysostoma* Philippi and *Rangia cuneata* (Gray), not positively known alive in the region to-day, probably belong to deposits laid down at this time. It is therefore very desirable that living specimens be obtained when recording a new northern or southern limit for a species.

POLYGYRA COLUMBIANA DEPRESSA, NEW SUB-SPECIES, FROM OREGON

BY HENRY A. PILSBRY AND JUNIUS HENDERSON

Shell small, thin, compact, light brown or tan; surface dull, covered evenly and rather closely with very short hairs which are weaker on the base and show in some specimens a slight tendency toward arrangement in parallel diagonal rows at about right angle with the fine growth lines; no other spiral sculpture. Spire low, but variably elevated. Whorls $5\frac{1}{2}$ or 6, closely, regularly coiled, increasing regularly in size, somewhat contracted behind the outer lip, which is reflected about one millimeter, and is evenly rounded from the upper termination over the periphery, slightly flattened on the base and passes by a more abrupt curve into the columella. Umbilicus small, open, but little covered by the slightly reflected columella. There is no trace of parietal or other apertural denticle on any specimen examined. (Plate 7, fig. 2.)

Holotype, Stanford University type collection, No. 5870: Alt. over all, 9 mm.; from umbilicus to apex, 6.5 mm.; diam. behind reflected lip, 13 mm. Topotypes, Stanford University type collection, No. 5871. Paratype, Philadelphia Academy of Sciences, No. 162435: Alt. 8.7 mm., diam. 14.7 mm. Figured specimens in University of Colorado Museum. All the specimens at hand are from The Dalles, Oregon, Henry Hemphill, collector. He labelled them *Mesodon columbiana depressa*, but apparently never described them, so we retain the name.

This form is quite unlike *P. mullani hendersoni* Pils., which was described from The Dalles. It is closely related to *P. columbiana pilosa* Henderson, but is smaller and decidedly more depressed, less dome-shaped, though somewhat variable in this respect.